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ABSTRACT

The Children's Personality Questionnaire (CPQ) was administered to 23 academically handicapped children (mean IQ, 79) and 35 academically gifted students (mean IQ, 147). The CPQ measures 14 distinct personality factors; data on these variables were analyzed using a 2 x 2 (academic ability x sex) analysis of variance design. A stepwise discriminant analysis investigated which combination of variables discriminate between the ability groups. Further discriminant analyses were also conducted, excluding personality factor B, the intelligence factor. Sex differences were found on eight factors; for this sample, an 83% accurate prediction for sex grouping could be made from the devised discriminant function. In addition to the significant ability group differences on the intelligence factor, differences were found on four other factors: emotional stability, assertiveness, enthusiasm, and boldness. Some interactions among personality factors and sex were also noted. It was suggested that various personality types can be taught effectively by increasing the structure in the learning environment for academically handicapped students, while reducing it in groups of gifted students. (GDC)

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Personality Factors and Instructional Methods

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Abstract

The Children's Personality Questionnaire was given to 21 academically handicapped and 35 academically talented children. The raw scores were analyzed by a 2[sex] X 2[Ability] multivariate and univariate analysis of variance and stepwise discriminate function analysis. Significant personality factor differences were obtained for sex and ability groupings but no interactions were found. Excluding the intelligence factor, an 80 per cent success rate of prediction for the ability grouping was obtained. The results were discussed in the light of structured and unstructured models of instruction.

Individual differences have been the centre of studies for many years (Cronbach, 1975). Individualized instruction in one form or another has had a shorter, but nontheless, vigorous life (Cronbach, 1967; Glasser, 1972; Levin, 1977). It is sometimes assumed that by grouping students on the basis of one particular dimension, reduced variability on other dimensions is realized. Grouping students in order to maximize instructional efficiency relies very heavily on this assumption.

One of the problems inherent in instructional efficiency studies is that within any particular group being studied, there are some students to whom the instructional method may be mathemagenic (Rothkopf, 1970) and some to whom the method may be mathemathanic (Cronbach & Snow, 1977). That is to say, certain instructional methods rather than having a positive effect may in actual fact have a null or negative effect in the presence of certain student characteristics which, of course, over the whole group tends to nullify any positive effect. Many times it is not possible to know what these student characteristics are unless they have been systematically studied prior to the instruction.

The usual method of investigating instructional efficiency is to take a group of students and examine them on certain outcomes under various instructional modes with the object of deciding which instructional mode is best. This method has inherent in it all the problems mentioned in aptitude/treatment interaction studies as outlined by Cronbach and Snow, (1977). An alternative is to look at already existing groups that have been established on certain criteria and try to determine common characteristics of those groups and from these observations suggest, based on theoretical considerations, the instructional methods which would most likely be optimal for that particular group.

The present paper addresses itself to this alternative by looking at the personality structure of two distinct groups, namely academically gifted and academically handicapped students and makes suggestions how, by knowledge of the group structure, certain of the Joyce and Weil (1972) teaching models could be utilized to maximize learning within those groups.

Method

Subjects

Twelve male and 11 female students in a mid-western Canadian school system whose IQ's were recorded at 80 or below comprised the academically handicapped students (LO), and 22 male and 13 female students whose IQ's were recorded at 130 and above comprised the academically gifted students (HI). The mean IQ of the HI group was 147 and that of the LO group was 79. The mean C.A. in months of the HI group was 141 and of the LO group was 167. The HI group consisted of two intact academically gifted classes within the school system, whilst the LO group were students drawn from the whole of the school system.

Test

The IPAT children's personality questionnaire (CPQ) is a test designed by Cattel (1967) which yields a general assessment of personality by measuring fourteen distinct dimensions of personality. Each dimension has been established by factor-analysis research as functionally independent. The CPQ has two parallel forms, Form A and Form B, with each Form divided into two parts.

Table 1 shows a complete listing of the fourteen factors with a brief description of each factor. For a more detailed description the reader is

referred to the Manual (Porter, Cattell & Ford, 1968).

Insert Table 1 here

Procedure

Both Forms A and B were administered in the fall of 1975 within a time period of one week.

Analysis

The raw score data on the 14 dependent variables were analyzed using a 2 (HI-LO ability) X 2(sex) multivariate and univariate analysis of variance [MANOVA & ANOVA] design. A stepwise discriminant analysis was carried out to investigate which combination of variables optimally discriminate between the HI-LO ability groups. Because of the obvious discriminiability of Factor B, (intelligence) further discriminant analyses were carried out excluding this factor.

Results and Discussion

The multivariate hypothesis of overall equality between the males and females was rejected [$F(14,41)=4.40$, $p<.001$]. The corresponding univariate F tests showed a significant difference in favour of males on factors D, E, F, Q_4 and N, and a significant difference in favour of females on factors A, Q_3 and I.

Insert Table 2 here

These results are remarkably close to those found by Porter and Cattell (1959) in the norming sample and Hakstian and Cattell (1975). The differences between these results and the reported ones are readily accounted for by the present study's restricted sample. The middle range of the intelligence continuum is not represented. Because of the restricted sample in the present study care should be taken in drawing conclusions about sex differences in terms of personality variables. However, it is interesting to note that for the sample in the present study an 83% accurate prediction for sex grouping could be made from the derived discriminant function. No further comment on these sex differences will be made; however, because of these observed sex differences, discriminant function analyses for ability groups were carried out on both the total group and on separate sex groupings.

The multivariate F-ratio for the ability groups was significant [$F(14,41) = 10.8$, $p < .001$]. The corresponding univariate F tests showed a significant difference in favour of the HI group on factors B, C, E, F and H. There were no significant interactions. The means and variances for the main effects are given in Table 2.

The significant difference between the groups on the intelligence factor (B) is to be expected. The children in the LO group scored low on the C Factor showing a tendency to become easily annoyed and to become dissatisfied with family and school. As a group they are also discouraged by their inability to meet good standards of behavior. These children tend to be docile and accepting of authority, like to set their own pace, whilst the HI group because of the large amount of assertive, agressive behavior could produce disobedience and rejection of authority (E). The high score of the HI group on the enthusiastic factor (F)

indicates that there is a tendency for the academically talented to be self-confident and optimistic. The probability of such children coming from a relatively secure and affectionate family background is fairly high. This is particularly true for females as is noted later. Finally the LO group tend to be shy and restrained and avoid as far as possible situations involving any social threat, whilst the HI group, on the other hand, interacts freely and boldly in social and group situations (H).

In order to investigate further the distinction between the personality "types" of the HI-LO groups, a discriminant stepwise analysis was performed. In a multivariate context there are many dependencies among the variables analyzed and thus it is quite possible that results from a stepwise discriminant analysis could vary from the univariate analyses. A stepwise discriminant function analysis essentially picks out from a given set of variables those variables that in combination discriminate maximally between two groups according to some prescribed criteria. The initial selection criterion was the largest overall F ratio for the multivariate test of differences between the group centroids. The F ratio, together with a consideration of Wilk's Lambda for the discriminant function, was the criterion used for entering each additional variable. A univariate F ratio of 1 at each stage was taken as the minimum value for consideration of inclusion of a new variable.

Table 3 shows the results of the stepwise discrimination analysis of the male group with Factor B (intelligence) excluded. Table 4 gives the results for the female group with Factor B excluded and Table 5 gives the results for both male and female combined with Factor B excluded.

Insert Table 3, 4, and 5 here

First we will examine the differences and similiarities between the males and females in terms of discrimination between the HI-LO groups. It is interesting to compare the results of Table 2, 3, 4, and 5 to observe how the analysis of each sex group differs from the univeriate analyses. Variable D and Q_4, which gave a significant difference in favour of the males in the univariate analysis, were also the variables in combination with other variables picked as discriminating between the HI-LO groups in the males in the discriminant analysis. One variable, F, which was significant in the univariate context, in favour of the HI group, however, was picked in the male and female groups and the male-female group as a variable in the discriminant function analyses, but had a greater discriminating power in the female function (+0.98) than the male function (+0.29). The variables A, Q_3, and I, showed significant differences in favour of the female groups in the univariate analysis, but only the Q_3 variable contributed in the discriminant analysis and this was both in the male (+.44) and female (-.67) groups with the greater discriminating power in the female group. The interpretation of the difference in the sign is that females who tend to reject cultural demands and be less conscientious of approved standards would tend to be in the HI group whilst males who were more careful of accepted protocol would be the ones in the HI group. However, this Q_3 factor was not a significant discriminating factor for the male--female group combined.

It is interesting to note that Factor C was significant in the univariate analysis in favour of the HI group, but was not used in the discrimination function.

As has already been stated, this apparently contradictory result can be accounted for by interdependencies among the analyzed variables. For example, variables N and F correlated significantly in the combined male and female group ($r=.51$; $p<.01$) and if F is picked then there is a possibility that N will also be chosen in spite of the fact that N was not significant in the univariate analysis. F and N were discriminators for male, female and male-female groups. The discriminating power of the N factor was high (-1.34) in the female group. That is to say the more naive a female student is to the ways of adults and peers and the less socially alert she is, the greater her chance of being in the high academic group. This N factor, although still important, does not carry so much weight in the male group (-.49). The variables which contribute most to a male student being in the HI group are the extent to which a student is excitable, demanding (D) and self--assertive together with perserverance and energy (G).

If the discriminant function obtained for the male and female group had been used on the same sample to predict to which group they should belong there would be a 79% success rate for the females and an 88% success rate with the males. These figures are excluding the B variable (intelligence). If this variable is also included, the success percentage (using male and female together) goes up to 95% with only three incorrect predictions out of 58.

In summary, then, it would appear that males and females do exhibit some similar personality characteristics within the academically gifted or academically handicapped groups, but there are also differences. Brief verbal descriptions of these differences have been pointed out in the paper, but the reader should refer to the Porter, Cattell and Ford (1959) manual for a fuller description of the factors in question; however, the limited size of the groups should be kept in mind when generali

to other populations.

In order to relate personality differences between academically talented and academically handicapped groups to instructional techniques, it is necessary to realize that however interesting male-female differences within groups are, instructional classes usually consist of both sexes and, therefore, Table 2 and 5 should be utilized.

Instructional techniques can be accommodating or compensatory/remedial. The former are instructional techniques that are matched to the group's personality structure, whilst the latter implies using instructional techniques that demand a certain personality structure that the group does not possess. The latter approach carries with it the assumption that the group personality structure may be modified to fit the demands of the instructional techniques.

Joyce and Weil (1972) proposed four families of teaching models based on philosophical and psychological positions. Each family includes specific teaching models.

Insert Table 6 here

The models included in Table 6 are some of the models suggested by Joyce and Weil (1972) and Weil and Joyce (1978). These have been modified and added to by the authors. Joyce and Weil (1972) suggest that one way of describing these models is the degree of structure the models impose on the learning environment. This degree may vary from very slight, such as in the discussion model, to very great, such as in a programmed learning model.

The present paper has shown that with the students in the HI group a learning

environment is needed which will capitalize on the student's enthusiasm, aggresiveness, and independence. As the HI group students will not be unduly perturbed at changes and are shrewd but socially bold, the best learning environment is one which is provided under what Joyce and Weil (1972) would call "relatively unstructured" models of instruction such as, among others, group investigation model, discussion model, inquiry model and discovery model. The LO group, who tend to become annoyed with people, are easily discouraged, tend to conform, are fearful of open competition and have difficulty in coping with new situations because of an artless disposition, would learn better under more structured learning environments such as, among others, an advance organizer model, programmed instruction model and simulation model.

The previous paragraph looked at matching learning environments from an accommodating perspective; however, instructors may want to approach the matching from a compensatory/remedial point of view. For example, it would be possible to put the HI group into a high-structured learning environment, such as the simulation model, which required a co-operative, non-aggressive atmosphere and thus demand personality characteristics of the HI group which the present study has shown they do not possess. Similarly by using the group investigation model with the LO group, because of the model's low structure, may help the LO group to change their submissive, restrained, self-deprecating attitudes. In either case, when using the models in such a way, the instructor must make value judgements as for what reason the models are being used, bearing in mind that it is still not certain as to what extent personality factors are a by-product of environmental factors interacting with cognitive factors and therefore not always amenable to modification.

The present paper has shown the existence of personality differences between academically talented and academically handicapped students and has suggested links

between these differences and instructional models. Many of these models are group models in a sense that the inquiry model is a group activity in contrast to a programmed learning model which is essentially individual. Implementing group models in a heterogeneous classroom, without causing mathemathanic behaviours (Cronbach & Snow, 1977) becomes a very difficult if not almost an impossible task for the teacher. These thoughts should be kept in mind in this era of mainstreaming where what we are "gaining on the social roundabouts" we may be "losing on the academic swings".

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Table 1

Personality Factors

Reserved	A	Outgoing
Less intelligent	B	More intelligent
Affected by feelings	C	Emotionally Stable
Phlegmatic	D	Excitable
Obedient	E	Assertive
Sober	F	Happy-go-lucky
Expedient	G	Conscientious
Shy	H	Venturesome
Tough-minded	I	Tender-minded
Vigorous	J	Doubting
Forthright	N	Shrewd
Placid	O	Apprehensive
Undisciplined self-conflict	Q_3	Controlled
Relaxed	Q_4	Tense

Table 2

Within variance and means for the main effects of Sex and Groups

Personality Factor	Within Variance	Means			
		Groups		Sex	
		HI	LO	M	F
A - outgoing, warm[a]	3.0	6.3	5.9	5.7	6.7**
B - intelligent	2.2	9.5	5.0*	7.9	7.5
C - emotionally stable	3.3	6.6	5.5**	6.4	5.9
D - excitable, overactive	3.4	5.5	5.0	5.8	4.7**
E - assertive, aggressive	2.3	6.1	4.8*	6.4	4.4*
F - lively, enthusiastic	3.1	5.7	4.6**	6.2	4.0*
G - conscientious	3.1	5.9	5.8	5.5	6.3
H - bold, venturesome	3.4	5.9	4.7**	5.5	5.3
I - tender-minded	3.6	4.3	4.5	3.5	5.8*
J - doubting, obstructive	2.8	4.2	4.4	4.3	4.2
N - shrewd	3.1	4.1	4.6	4.7	3.8**
O - apprehensive	3.6	4.1	4.7	4.2	4.6
Q_3- self-discipline	3.0	6.1	5.7	5.6	6.5**
Q_4- tense, frustrated	3.8	4.9	4.6	5.2	4.2**

[a] Adjectives for students scoring at the positive pole, or high score, of the factor.

* $p<.001$

** $p<.05$

Table 3

Stepwise discriminant function analysis

between the high-low ability groups for the males

Variable	F value to enter	Wilks' Lambda	Standardized discriminant function coefficent
C	2.3	0.48	-0.44
D	1.8	0.55	0.70
E	4.6	0.87	0.52
F	1.3	0.45	0.29
G	4.1	0.69	0.69
N	2.0	0.51	-0.49
Q_3	2.0	0.58	0.44
Q_4	3.0	0.62	0.40

Eigenvalue=1.20; χ^2=22.1; d.f.=4; p<.005; canonical correlation=0.74

Table 4

Stepwise discriminant function analysis

between the high-low ability groups for the females

Variable	F value to enter	Wilk's Lambda	Standardized Discriminant function coefficient
F	1.2	0.67	0.98
H	2.9	0.55	0.69
N	1.8	0.63	-1.34
O	2.1	0.49	0.44
Q_3	1.04	0.60	-.067

Eigenvalue=1.05; χ^2=13.9; d.f=5; p<.05; canonical correlation=0.71

Table 5

Stepwise discriminant function analysis

between the high-low ability groups for males and females combined

Variables	F value to enter	Wilk's Lambda	Standardized Discriminant function coefficient
D	3.3	0.73	0.48
E	8.6	0.87	0.44
F	1.3	0.71	0.36
H	2.7	0.78	0.46
N	3.5	0.82	-0.67

Eigenvalue=0.40; χ^2=18.0; d.f.=5; p<.01; canonical correlation =.53

Table 6

Summary of Teaching models[a]

Family	Models	Structure
Information Processing	Inductive Thinking	Moderate progressing to low
	Inquiry Training	High progressing to low
	Concept Attainment	High progressing low
	Developmental	High
	Advance Organizer	High
Social Interaction	Group Investigation	Low
	Jurisprudential	High
	Simulation	High
Personal	Value Clarification	Moderate progressing to low
	Synectics	Moderate
	Discussion	Low
	Role Playing	Moderate
Behaviour Modification	Programmed Learning	High
	CAI	High
	Mastery Learning	High progressing to low
	Contingency Contracting	High

[a] adapted by the authors from Joyce and Weil (1972)